Guide to Assessing the Drinking Water Well for Real Estate Transactions

DISCLAIMER The following information is intended to be a guide only. It assumes you intend to hire a professional to complete the assessment and want to be an informed consumer. If you have specific questions or special conditions, contact your local health department for advice on where to obtain qualified assistance.

Water quality and well yield are usually the two main homebuyer concerns with domestic wells. Checking out the domestic well is a good idea before buying a property. Knowing what you need to have checked is paramount to getting useful information and making informed decisions.

For water quality, have a coliform bacteria and a nitrate (as N) analysis completed. The well should be free of coliform bacteria and have a nitrate (as N) level of less than 10 mg/L. You may also wish to have a hardness, specific conductance, iron, and manganese tested to ensure the aesthetic quality of the water will meet your needs. The water sample(s) can be collected from an interior faucet. If the house has a water treatment device, you may wish to have a sample collected from before the treatment system and one after treatment in order to compare results.

The nitrate (as N) analysis is very straightforward; there are no special techniques or precautions utilized to pull the water sample. When reviewing the results, use caution if the nitrate (as N) is above 5 mg/L since this level may be indicative of some sort of human caused impact. In-home treatment devices can be installed to address elevated nitrate (as N) in drinking water. There are areas around Montana where nitrate (as N) in ground water is at 5 mg/L or higher. If the nitrate (as N) concentration is above 10 mg/Lm the water is not suitable for drinking and should be treated prior to consumption.

The coliform bacteria test requires a bit more oversight on your part. Specifically, some folks will disinfect the well with household chlorine bleach several hours before pulling the sample for the coliform analysis. The resulting coliform report is probably not representative of water in the well. So, you want to make sure you specify that the coliform sample be taken without disinfection immediately preceding it. There should be at least a couple of days between well disinfection and pulling the coliform sample (this time criteria assumes the house is occupied and the well is in use). You should know that it is uncommon for an aquifer to be contaminated with coliform bacteria but not uncommon for a well to be reported as coliform positive at the first coliform test (somewhere around 20% of the domestic wells in Montana are coliform positive on the first analysis when randomly sampled). So, if the coliform result is positive, the well should be disinfected and re-tested after a week or so of use. If the second test is positive, a more rigorous disinfection (bulk displacement) should occur. If subsequent tests are positive, the source of the contamination should be investigated and remedied. **Water reported to be “fecal positive” should not be consumed until the well is disinfected and subsequent samples are coliform free.**

Tests for hardness and specific conductance can help assess the aesthetic quality of the water. Most natural water supplies contain at least some hardness due to dissolved calcium and magnesium salts. Other minerals, such as iron, may contribute to the hardness of water, but in natural water, they are generally present in insignificant quantities. The total hardness of water may range from trace amounts to hundreds of milligrams per liter. The amount of dissolved calcium and magnesium ions in water determines its "hardness." When excessive amounts of these minerals are present in water, certain nuisance problems occur, including decreased life of water-using appliances and increased difficulty in cleaning and laundering tasks. Hardness is measured in milligrams per liter (mg/L) as calcium carbonate ($CaCO_3$).

Water Hardness Classification	
Hardness	**Concentration**
Very Soft Water	0 to 17 mg/l (0 to 1 grain/gallon)
Soft Water	17.1 to 51.3 mg/l (1 to 3.5 grains/gallon)
Moderately Hard Water	51.4 to 119.7 mg/l (3.5 to 7 grains/gallon)
Hard Water	7 to 10.5 grains /gallon (119.7 to 179.55 mg/l)
Very Hard Water	Over 179.55 mg/l (over 10.5 grains/gallon)

Specific conductance is a measurement of the water's capacity to conduct an electric current. Specific conductance varies with the concentration of dissolved solids (from rocks and soils) in the water and their degree of ionization. Drinking water is generally between 50 to 1500 umhos/cm

Specific conductance can be used to estimate total dissolved solids. When measured in micromhos/cm, specific conductance is generally 1 to 1.5 times the total dissolved solids content. Water with more than 1,000 mg/L of dissolved solids may contain minerals that impart a distinctive taste.

Iron and manganese concentrations above 0.3 mg/L and 0.05 mg/L respectively may affect the aesthetic quality of the water primarily by causing staining on fixtures inside the house and on the outside of the house where hit by sprinklers.

Well yield testing is a bit more complicated. Typically a driller or other groundwater professional is retained to perform a mini-pump test on the well. This is intended to ensure that the well is likely to yield a sufficient quantity of water to run a household including lawn and garden irrigation. How much effort needs to go into this test varies but here are a few thoughts:

The well is yield tested to determine the flow rate and yield based on inferred demand. For a typical well serving a single-family residence, the well should be pumped at 10 gallons per minute for a minimum of one hour. If large areas of lawn are to be watered in the summer, the test should be extended to make sure the well will be able to keep up with the increased summer demand. For example, you may want to ask for the yield test to be run for 4 or 6 hours at 10 gpm instead of simply running a one-hour test. A lower yielding well can be pumped at a rate less than 10 gpm but the test length should be increased accordingly; for example, 6 gpm for 2 hours or 4 gpm for 4 hours (again, longer if significant lawn watering is anticipated).

The yield test is usually completed using a hose on an outside spigot with the water running to waste. For the flow measurement, a 5-gallon bucket and stopwatch is often used. The on/off cycle of the pump is measured using a stopwatch and requires access to the area of the pressure tank.

In addition to the flow test, the well itself is inspected to determine the casing height, check drainage at the casing, check vented well seal condition, check electrical wire conduit, and check surface separation distances to the septic system and neighbors septic systems.

Here is a simple checklist that can be used for the water system. Whoever does the yield test should use something like this. Keep in mind that the inspector will only be able to provide a description of condition based on physical appearance. They are unable to provide a guarantee concerning the useful remaining life of any of the water system or well components.

Date_____
Completed by_____

Well and Water System Checklist

Checked? Yes/No	Component	Component Information	Notes
	Condition or Age of Pump**	_____Year Installed _____Volts	
	Condition of Pressure Tank	_____gallon capacity _____Make/Model	
	Condition of Treatment Equipment/Filters, if any		
	Casing Height >12-18”	_____inches above ground	
	Positive Drainage at Casing		
	Conduit Condition		
	Condition of Vented Well Seal		
	Depth of Pump Setting**		
	Total Depth of Well	_____feet	
	Static Water Level	_____feet below casing top	
	Test Rate (gpm)	_____gpm	
	Test Duration (hrs)	_____hours	
	Pumping Water Level	_____feet below casing top	
	Pump cycle time	_____minutes on _____minutes off	
	Separation from septic systems >100’	_____feet to drainfield _____feet to septic tank _____feet to sewer line	
	Well Log	_____GWIC ID	
	Water Right	_____WR #	
	Water Samples-Coliform Nitrate	_____result _____result	

**Information may not be available